

Substitute Specification
Submitted Jan 23, 2004

METHOD OF RESTORATION OF MECHANICAL PROPERTIES OF
A CAST NICKEL-BASED SUPERALLOY FOR SERVICED
AIRCRAFT COMPONENTS

FIELD OF THE INVENTION

[0001] The present invention is directed to structural aircraft components composed of cast INCONEL® 718 and forged WASPALOY™ or cast INCONEL® 718 and forged INCOLOY® 718/903/907/909, among others.

BACKGROUND OF THE INVENTION

[0002] Many structural aircraft engine components are made of a combination of either solid cast INCONEL® 718 or cast INCONEL® 718 and a separate forged component. INCONEL® is a registered trademark of Huntington Alloys Corporation of Huntington, West Virginia. The separate forged component is usually a material such as forged INCONEL® 718, forged WASPALOY™, or forged INCOLOY® 903/907/909, among others. WASPALOY™ is an unregistered trademark of Haynes International, Inc. of Kokomo, Indiana. INCOLOY® is a registered trademark of Inco Alloys International, Inc. of Huntington, West Virginia. These materials are commonly joined as an inseparable assembly by welding them together. During engine operation, these components may develop cracking in one of the materials rendering the component non-serviceable.

[0003] Cast INCONEL® 718 is a nickel based superalloy that obtains its desirable properties by precipitation hardening at an elevated temperature. INCONEL® 718 is a well-known trademark for a nickel-based superalloy having a nominal composition, in weight percent, of about 18.5 percent iron, about 18.5 percent chromium, about 5.1 percent niobium, about 3 percent molybdenum, about 0.9 percent titanium, about 0.5 percent aluminum, about 0.04 percent carbon, and balance nickel, which composition is well-known to those skilled in the art. Both the cast INCONEL® 718 and the associated wrought structures have the desirable physical properties of warm temperature strength, creep strength, stress rupture strength, and fatigue resistance, for

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